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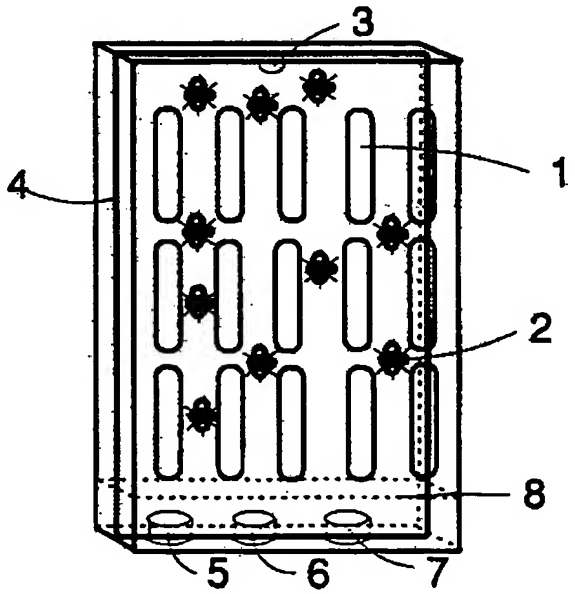

(57) Abstract

An improved insect trap for attracting and destroying flying or crawling insects, especially flies, but also cockroaches, is described. The insect trap has the features that: a) it comprises a flat, essentially two-dimensional container having one or more entry (1) openings for the insects; b) the container is made of a transparent material which is inert toward moisture, the insecticide formulation and environmental influences; c) the material is colourless or has a colouration attractive to flying insects; d) the container is considerably higher and broader than it is deep; e) the container has a topping-up opening for liquids; f) a water-soluble, -emulsifiable or -dispersible insecticide formulation is present as the insecticide (5); and g) the insecticide formulation additionally contains an insect attractant.

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Insect trap

The present invention relates to an improved trap for controlling insects, in particular flying or crawling insects, preferably flies, but also cockroaches, and to the use according to the invention of the said trap.

The trap according to the invention is a container for attracting and destroying insects, such as flying or crawling insects, especially flies, but also cockroaches, which, as a fly trap, is preferably to be positioned upright in front of a natural or artificial light source and, as a cockroach trap, is used lying flat. The container includes an insecticide formulation, an absorbent matrix for absorbing the insecticide formulation and a fixing device. The insect trap has the features that

a) it comprises a flat, essentially two-dimensional container having one or more entry openings for the insects;

b) the container is made of a transparent material which is inert toward moisture, the insecticide formulation and environmental influences;

c) the material is colourless or has a colouration attractive to flying insects;

d) the container is considerably higher and broader than it is deep;

e) the container has a topping-up opening for liquids;

f) a water-soluble, -emulsifiable or -dispersible insecticide formulation is present as the insecticide; and

g) the insecticide formulation additionally contains an insect attractant.

The diagrams Figure 1 and Figure 2 show the schematic structure of an insect trap according to the invention. The diagrams serve merely for better understanding and

represent only one of the numerous modifications of the insect traps according to the invention. In this case, the traps are pure fly traps for vertical fixing in front of a light source, for example a window pane.

Explanations of the diagrams:

Figure 1: Schematic diagram of a single-chamber fly trap

Cubic shape, open at the top, with entry slits on the front side and absorbent paper and tablets on the inside.

1 entry opening on the front side
2 black shadow images of flies on the front side
3 opening on the rear for hanging up the trap
4 absorbent paper standing vertically inside
5 water-soluble tablet comprising the insecticide
6 water-soluble tablet comprising the sugar
7 water-soluble tablet comprising the yeast
8 visible mark up to which water is topped up

Figure 2: Schematic diagram - cross-section of a two-chamber fly trap, side view

4 absorbent paper standing vertically inside
9 rear wall
10 front side (with entry openings - not shown)
11 base
12 protrusion of the front side which separates the upper part (upper chamber) from the lower part (lower chamber) of the trap
13 closable topping-up opening for water

Insects, especially representatives of the Brachycera genus (flies), are present practically everywhere and are extremely undesirable in certain regions, such as farms and industrial plants, but also in households and in the hygiene sector, since not only are they a troublesome factor, but they are known above all as transmitters of disease because of their way of life. As is known, flies visit not only flowers, fruit, foodstuffs, decaying waste, carcasses, faeces and the like for food intake, but also humans and animals, and they are loaded with a large number of quite different pathogens and transmit these from

one place to another, in this way contributing to a considerable extent to the spread of the most diverse diseases. It has thus been proved that flies can transmit bacterial infections, for example shigellosis, salmonellosis, cholera or camphylobacteriosis; infections caused by protozoa, such as amoebic dysentery; worm diseases (for example infections caused by Enterobius, Ascaris, Trichiuris, Ancylostoma, Necator, Taenia or Dipylidium); virus infections, for example poliomelengitis; rachitic infections, for example caused by Coxiella burnettii, and infections of the eyes, which can be either viral or bacterial in origin. Skin infections, in particular in connection with skin injuries, should also be mentioned. On the other hand, wasps and hornets are rather troublesome and at most potentially fatal to allergic individuals. However, in general they are in many places just as undesirable as houseflies, other Musca species and bluebottles.

It is therefore not really surprising that many efforts have been made to solve this problem. In addition to numerous highly active insecticidal substances, a wide range of use forms with which attempts have been made to master this problem has been developed; starting from tacky fly catchers for hanging up, which hold the insects mechanically, via active ingredient sprays and the most diverse embodiments of strips of fabric comprising active ingredient, to heated matrices which vaporise the active ingredient continuously into the environment.

It is found again and again here that a number of problems are associated with controlling such insects, these problems being caused on the one hand by the specific way of life and behaviour of the insect and on the other hand by the form of application.

Since the target insects do not remain limited locally to a certain area, but because of their ability to fly and mobility have a wide scope of movement, and moreover usually cause trouble where there are humans or animals or, for example, foodstuffs are stored, controlling them is a difficult undertaking from the beginning, since it is not desirable to contaminate humans, animals or foodstuffs with the active substance.

The previously ubiquitous tacky fly strips which were hung under the ceiling have in many cases disappeared from the market and been replaced by modern use forms which the consumer can use more effectively and conveniently.

Spray cans, which the user in general uses at discretion and therefore in completely uncontrollable form, still belong to the forms of application sold the most. This use carries

not only the risk of incorrect handling, for example by overdosing; but also the risk that the active substance, solvent and other formulation auxiliaries are sprayed onto foodstuffs or land on objects where the surface is attacked by the constituents. Moreover, safe disposal of these spray cans represents a problem which has not yet been solved satisfactorily. With this use form, the active substance, formulation auxiliaries and propellent gas are distributed over a wide area and can be both over- and under-dosed. The active ingredient then usually remains in the treated rooms in diluted form for a relatively long period of time, which greatly promotes resistance development in insects and consequently means that either the active ingredient concentration must first be increased considerably or active ingredients having a new action mechanism must be used, for success to be guaranteed on renewed use.

Another widespread use form comprises small platelets of fabric, paper or felt which are permeated with a viscous or dry active ingredient formulation and release the active ingredient to the environment via the vapour phase either already at room temperature or by using specific, usually electrically heated devices. As with the sprays, here also the active ingredient is usually finely divided in closed rooms together with other volatile formulation constituents and reaches, via the vapour phase, not only the target insect but unavoidably also all objects and other living beings in the corresponding room. Here also, the active ingredient can be over- and under-dosed, and experience shows that the lay person tends to overdose. The contamination problem is also unsolved in this case. Moreover, a large number of these use forms require a special electrical heating unit, which unavoidably consumes a small but inevitable amount of energy and can represent a source of danger, especially for infants.

It is undisputed that insecticides which are used as sprays or via the vapour phase in correspondingly high amounts solve the insect problem in the short term. However, this is achieved only by accepting the undesirable secondary effects described.

Because of the said disadvantages, insect traps of the most diverse design have been developed with the aim of attracting the insect into the trap or to its vicinity and therefore bringing it into contact with the active ingredient in a locally limited area and destroying it. This has the advantage that contact poisons of low vapour pressure can be used and do not enter the environment with this use form, and at the same time the dead insects are not scattered over an entire room, but are collected by the insect trap and destroyed together with this or are in its immediate environment. Such use forms range from adhesive strips,

which are stuck onto the window, for example, to plastic or plastic or paper containers with fly holes, in which the active ingredient is incorporated in a porous or fibrous matrix, often paper. Either a solid active ingredient formulation or an aqueous moist active ingredient formulation is used in this category of forms of application. Attractive colours are used as aids, blue, yellow and red shades mainly being represented. Although this use form does not have the disadvantages described for sprays, such as, in particular, overdosing and contamination of humans, animals or foodstuffs, it has another problem which it has not yet been possible to solve to suit conditions in practice and therefore satisfactorily.

In particular, with all insect traps the problem arises that the insect must arrive at the site of the contact poison so that an action can be achieved at all. It has been found that it is extremely difficult to attract insects, and especially flies, to a particular site and leave them there until a sufficiently high amount of poison has been absorbed. Furthermore, the best action is achieved if the poison is absorbed through the digestive tract. Consequently, not only must the insect reach the correct site, it must also be encouraged to eat the poison.

Experience shows that insect traps which exert no attractive stimuli at all on the insect are completely useless, since their efficiency depends on chance. Only an insect which enters the trap purely by chance and stays there sufficiently long will be killed. Efforts have therefore been made to induce the insect, by choosing the colour of the trap, by choosing the location and by attractant substances, preferentially to visit the trap. However, it has been possible to achieve only partial successes with the known traps, since neither are their colours which the insects find attractive to a decisive extent, nor are sufficiently attractive attractants available. It is particularly difficult to discover attractants or fragrances or baits which the insect perceives as attractive and at the same time are registered as neutral or even as pleasant by humans or by stock animals. Insects often find the most foul-smelling substances particularly attractive. The known substances used as insect attractants leave something to be desired in respect of their attractiveness when they are used by themselves. Furthermore, usually no locations where the insects arrive so preferentially that they could be controlled completely successfully there by conventional traps can be defined.

It has now become possible for the first time to construct such attractive traps for insects which no longer have the undesirable secondary effects mentioned. All the advantages in respect of easy handling, avoidance of contamination of humans and the environment,

prevention of resistance development, easy disposal and at least partial degradation of the active substance, and above all a high efficiency can be combined together at the same time with this improved trap. A particularly noticeable advantage of the novel trap is its safe handling, since it can now also be put into effect by inexperienced users and even children, without endangering these people with the insecticide. The fact that the dead insects are in the trap and can be destroyed with this will also be appreciated by the user.

The observations and findings listed below have been utilised and combined in an optimum use form in this novel construction.

The object was initially to bring only the target insect into contact with the contact insecticide, without endangering humans, animals or the environment by the active ingredient or other chemical components of the insecticide formulation. For this, it is necessary for the insecticide to be in the trap and also to remain therein and only to act there. It is furthermore necessary for a powerful attraction to be exerted on the insect, so that this does not visit the trip by chance but purposefully and as quickly as possible, even before it has an opportunity to absorb pathogens or to spread these.

It has now been possible to achieve this object by the trap according to the invention by combining and optimising certain parameters. In fact, it has been found that the combination of the factors listed below is decisive for a significant increase in the efficiency of an insect trap:

1) The trap must comprise a flat, essentially two-dimensional container. This is to be understood as meaning a container which in principle has the shape of a parallelepiped or is derived from this basic shape. Containers which are considerably broader and higher than they are deep are preferred; i.e. containers which have a large surface area but are not particularly deep. While their depth can be from about 1 mm to about 5 cm, preferably 1 to 2.5 cm, their height is about 10 to 50 cm and their width in the range from about 6 to 50 cm. Such a trap in general has, when viewed from the front or rear, a square or rectangular shape, it being completely irrevelant for the mode of action whether, for example, the corners are rounded or whether there are other minor deviations from the basic shape. Rectangular traps, in particular those which are higher than they are wide, are particularly advantageous. Two usual formats have, for example, the following dimensions: height about 31 cm/width about 21 cm/depth about 1 cm and height about 21 cm/width about 15 cm/depth about 1 cm. The wall can be either rigid or flexible. It can

of course also be designed such that the rear wall and the side components are rigid and the front part is made of flexible material. The trap can also be designed as a flexible plastic bag. The terms "height" and "width" are used here in respect of a trap for flying insects, preferably a fly trap. In the case of a trap for crawling insects, for example for cockroaches, the term "height" is of course to be exchanged with "depth", since cockroach traps are used lying flat on the floor and are therefore essentially lower than they are deep.

2) The trap must have entry openings for the insects, which are at the same time also the exit openings for attractive fragrances. These openings can be of practically any shape. They can be larger openings covered by a coarse-mesh net. They can be circular, square or otherwise shaped holes. It is important that they are wide enough for the target insect to pass comfortably through. However, vertical slits located on the trap or darker lines printed on vertically, if no slits but openings of a different shape are chosen, are particularly advantageous, since it has been found, in fact, that flying insects, especially flies, preferentially fly to vertical lines. The entry openings are usually located on only one side of the trap; in the normal case, on the front side. For handling in practice, it is of advantage if the entry openings can be closed for the storage period and later for disposal of the trap. This is achieved, for example, by covering these openings with an occlusive film which is peeled off before the trap is used and can be replaced as a cover over the trap after use, or by surrounding the trap with a casing, which can be reused if appropriate.

3) It is particularly important for the trap to be made of an inert and in particular transparent material. It should not be possible for it to be destroyed by the insecticide formulation or by water, and in particular must allow light through. Flying insects, and especially flies, in fact find dark patterns on a light background, and light/dark contrasts anyway, for example patterns which stand out significantly, considerably more attractive than purely dark or purely light areas. They like best dark lines on a transparent background through which light shines. This observation can be made at any window through which natural or artificial light falls. The attractiveness can be intensified further by skilful colouring. Suitable materials which are permeable to light are polymeric plastics, for example polyethylene or polypropylene and the like, in either rigid or flexible form. This material can be either colourless or shaded. Yellow, orange-coloured or red shadings have proved to be particularly advantageous. The attractiveness of the trap can also be increased considerably if it additionally has life-size images (silhouettes) of flies. It has been found, in fact, that accumulations of flies particularly attract other flies, although only if these images are located on a transparent surface through which light

falls. Observation furthermore shows that other flies are attracted not only by the decay products of dead flies but, surprisingly, also by images of flies, especially if they are as true to nature as possible and thus come very close to genuine flies in outline, colour and size.

4) The trap must be designed such that it can accommodate the insecticide without it passing unintentionally out of the entry openings. It therefore usually has a region of about 3-5 cm height without entry openings at the lower edge. The liquid or, before use, solid insecticide formulation and the other additives essential to the invention are usually found in this part.

5) The trap contains inside it an absorbent matrix of a naturally occurring or synthetic, fibrous or porous material, in the simplest case of absorbent paper, which matrix is capable of accommodating the liquid insecticide formulation and distributing it over a large surface over the entire matrix. This matrix advantageously has approximately the extent of the trap, i.e. it has a square or rectangular shape and is somewhat smaller in respect of height and width than the trap itself, so that it fits conveniently into the trap. It serves to distribute the insecticide and any attractants within the trap such that a sufficient amount of the insecticide is available in liquid form to the entering insect behind each entry opening. In traps which are constructed in the form of flexible bags, it is advisable to design the matrix such that it imparts a certain rigidity to the trap and produces enough space inside the trap for the target insects to crawl in comfortably. This can be achieved with a matrix of paper, for example, by this being folded (a zig-zag shape, for example, when viewed in cross-section). This folding means that a trap in the form of a plastic bag is not undesirably flat but is given a somewhat inflated form. The matrix can either be made of neutral material or be baited with the insecticide.

It goes without saying that the trap is produced from a colourless transparent plastic and, instead, the absorbent matrix inside is coloured.

6) The trap comprises a water-emulsifiable, -dispersible or, preferably, water-soluble insecticide, which preferably acts via the gastrointestinal tract of the target insect. Insecticides which are particularly suitable are organophosphorous compounds and carbonates, for example:

dichlorvos [= 2,2-dichlorovinyl dimethyl phosphate];

dimethoate [= O,O-dimethyl S-methylcarbamoylmethyl phosphorodithioate];
trichlorfon [= 2,2,2-trichloro-1-hydroxyethyl phosphonate];
dicrotophos [= (E)-2-dimethylcarbamoyl-1-methylvinyl dimethyl phosphate];
iodofenphos [= O-2,5-dichloro-4-iodophenyl O,O-dimethyl phosphorothioate];
ethion [= O,O,O',O'-tetraethyl S',S'-methylene-bis(phosphorodithioate)];
azamethiphos [= S-6-chloro-2,3-dihydro-2-oxo-1,3-oxazolo-[4,5b]pyrid-3-ylmethyl-O,O-dimethyl phosphorothioate];
chlorfenvinphos [= 2-chloro-1-(2,4-dichlorophenyl)vinyl diethyl phosphate];
coumaphos [= O-3-chloro-4-methyl-2-oxo-2H-chromen-7-yl O,O-diethyl phosphorothioate];
fenchlorphos [= O,O-dimethyl O-2,4,5-trichlorophenyl phosphorothioate];
malathion [= O,O-diethyl O-4-notrophenyl phosphorothioate];
naled [= 1,2-dibromo-2,2-dichloroethyl dimethyl phosphate];
propetamfos [=3-[ethylamino(methoxy)phosphinothioyloxy]isocrotonate];
dioxathion [= S,S'-(1,4-dioxane-2,3-diyl) O,O,O',O'-tetraethyl bis(phosphorodithioate)];
phosmet [= O,O-dimethyl S-phthalimidomethyl phosphorodithioate];
propoxur [= 2-isopropoxyphenyl methylcarbamate];
bendiocarbe [= 2,2-dimethyl-1,3-benzodioxol-4-yl methylcarbamate (I)];
methomyl [= S-methyl N-(methylcarbamoyloxy)thioacetimidate];
dimetilan [= 1-dimethylcarbamoly-5-methylpyrazol-3-yl dimethylcarbamate];
bromophos [= O-4-bromo-2,5-dichlorophenyl O,O-dimethyl phosphorothioate];
chlorpyrifos [= O,O-diethyl O-3,5,6-trichloro-2-pyridyl phosphorothioate] and
diazinon [= O,O-diethyl O-2-isopropyl-6-methylpyrimidin-4-yl phosphorothioate].

Azamethiphos is particularly preferred. However, it is also possible to use pyrethroids, for example:

permethrin [= 3-phenoxybenzyl (1RS,3RS;1RS,3RS)-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate];
cypermethrin [= (R,S)-α-cyano-3-phenoxybenzyl (1RS,3RS;1RS,3RS)-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate];
cyhalothrin [= (RS)-α-cyano-3-phenoxybenzyl (Z)-(1RS,3RS)-(2-chloro-3,3,3-trifluoro-phenyl)-2,2-dimethylcyclopropanecarboxylate];
bioallethrin [= (S)-3-allyl-2-methyl-4-oxycyclopent-2-enyl (1R,3R)-2,2-dimethyl-3-2-methylprop-1-enyl)cyclopropanecarboxylate];
bioresmethrin [= 5-benzyl-3-furylmethyl (1R,3R)-(2,2-dimethyl-3-(2-methylprop-1-enyl)-

cyclo-propanecarboxylate];
deltamethrin [= (S)-α-cyano-3-phenoxybenzyl-
(1R,3R)-(2,2-dibromovinyl)-2,2-dimethylcyclopropane-carboxylate]; and
pyrethrin [= (Z)-(S)-2-methyl-4-oxo-3-(penta-2,4-dienyl)-cyclopent-2-enyl(1R,3R)-
2,2-dimethyl-(2-methylprop-1-enyl)cyclopropanecarboxylate].

Active substances having a different direction of action can of course also be combined with one another. Before the use according to the invention, the active ingredient is most advantageously in solid form. It can be the pure active ingredient in the simplest case, or a solid active ingredient formulation. The active ingredient or the active ingredient formulation can, for example, lie at the bottom of the trap in the form of a powder or in the form of a water-soluble tablet (for example effervescent tablet), in a water-soluble bag or a water-soluble capsule, in the form of water-soluble granules or in a device (bag, capsule and the like) which can easily be destroyed mechanically and can be opened before use, for example by gentle pressure.

7) The trap has an opening, which can be closed if appropriate, for filling with water. In the simplest case, the trap is open at the top or can be opened at the top. Water is added through this opening immediately before use, the amount of water being added either in accordance with the information on the use instructions or, in a preferred embodiment, being introduced by topping to a visible mark (for example horizontal line of different colour above the lower edge or lower part of the trap). Other liquids attractive to insects can of course also be added to the water, for example beer, fruit juices and the like. On the other hand, by addition of vinegar, for example, bees are prevented from entering this trap. The embodiment with the visible mark moreover has the advantage that volumes of liquid which have evaporated can be replaced by simply topping up without any measurement or calculation.

8) It is particularly important that the trap comprises an insect attractant in addition to the insecticide or insecticide mixture.

There are a large number of substances of natural or synthetic origin which can be employed as the attractant in the context of the present invention, some of the substances not only exerting an attractant action but additionally also serving as food. These include, for example, malt, orange peel essence, honey, sugar (such as maltose, lactose, sucrose, glucose, galactose, raffinose, invert sugar and the like), dried fruits (such as currants,

prunes, apples, pears, peaches, apricots and the like), vanillin, cereal flours, milk powder, egg powder, meat flour, fish meal, bone meal, yeast powder, natural or artificial fruit, meat or cheese aromas, amino acids, pollen extracts, thymol, skatole, indole, eugenol, terpineol, farnesol, geraniol, phenylethyl alcohol, paraformaldehyde, hexamethylenetetramine, ammonium carbonate, aliphatic amines, combinations of tertiary amines with carboxylic acids, papain, pancreatin, aliphatic lactones, chlorinated alkenes (such as 3-chloro-3-methyl-but-1-ene, 1-chloro-3-methyl-but-2-ene and the like), higher straight-chain or branched alkenes having about 19 to about 24 carbon atoms, the ethylene bond of which lies between C-7 and C-11 (for example the following alkenes in the cis, trans or cis/trans configuration: 9-methyl-octadec-9-ene, nonadec-9-ene, 2-methyl-nonadec-9-ene, eicos-9-ene, 2-methyl-eicos-8-ene, 8-methyl-eicos-8-ene, 10-methyl-eicos-8-ene, 2-methyl-eicos-9-ene, 10-methyl-eicos-9-ene, 19-methyl-eicos-9-ene, heneicos-9-ene, 2-methyl-heneicos-8-ene, 8-methyl-heneicos-8-ene, 2-methyl-heneicos-9-ene, 10-methyl-heneicos-9-ene, 19-methyl-heneicos-9-ene, 20-methyl-heneicos-9-ene, 19-ethyl-heneicos-9-ene, docos-8-ene, docos-9-ene, 2-methyl-docos-8-ene, 8-methyl-docos-8-ene, 10-methyl-docos-8-ene, 2-methyl-docos-9-ene, 10-methyl-docos-9-ene, 19-methyl-docos-9-ene, 20-methyl-docos-9-ene, 21-methyl-docos-9-ene, 19-ethyl-docos-9-ene, 20-ethyl-docos-9-ene, tricos-7-ene, tricos-8-ene, tricos-9-ene, tricos-10-ene, tricos-11-ene, 2-methyl-tricos-8-ene, 2-methyl-tricos-9-ene, 9-methyl-tricos-9-ene, 10-methyl-tricos-9-ene, 19-methyl-tricos-9-ene, 20-methyl-tricos-9-ene, 22-methyl-tricos-9-ene, tetracos-9-ene, tetracos-10-ene), acuba fruit extract and aliphatic polyol monoesters.

A particularly high attractant action is shown, surprisingly, by aqueous substance mixtures which undergo a fermentation process, i.e. mixtures of the abovementioned feedstuffs and attractants which start to ferment after addition of water. A particularly preferred attractant therefore comprises the aqueous combination of sugar, starch or honey with yeast. As soon as such a combination starts to ferment, substances which exert an irresistable attractiveness to flies in particular and additionally have the advantage that humans and pets do not feel annoyed are evidently released.

Practically all the usual types of yeast are possible here, for example baking yeast and brewer's yeast. In the same way, practically any sugar or any substrate having a high sugar content for example honey, sorbitol, thickened fruit syrup or sugar molasses and the like, can be used. The usual cane sugar or beet sugar is preferred. The yeast and sugar are most

advantageously present in solid and dry form before the use according to the invention of the trap. This contributes in particular to storage stability of the trap. The two can be present together or separately as a powder, in pressed form as a tablet, as water-soluble capsules or bags and the like. It is important only that they are dissolved on addition of water or come into contact with one another in the aqueous phase and mix with the active ingredient. The resulting mixture in general triggers off a fermentation process which contributes quite considerably to the efficiency of the insect trap. As already mentioned above, the aromas released during the fermentation process are extremely attractive to insects, especially flies, and have no repellent or adverse action on humans and animals. In addition, the fermentation process leads to complete or partial degradation of the insecticidal active substance in time in the case of most water-soluble insecticides. This has considerable ecological advantages in disposal of the trap.

9) It is essential to the invention that the active ingredient is in an aqueous phase when used, since this considerably promotes ingestion by the insect and significantly increases the efficiency of the trap. Liquids are preferentially ingested by insects and do not first have to be converted into a soluble form by insalivation.

10) For practical and use-related reasons, it is advantageous if the trap has a hanging-up or fixing device. This can be a hole, an eye or a hanger in the simplest case, or a more specific device, for example a suction pad for attachment to a smooth surface, preferably to a window pane.

11) By far the most efficient use form comprises positioning of the insect trap according to the invention in front of a natural or artificial light source. This can be either a window pane or a lighting fixture. Most flying insects, including flies, stay mainly at light sources. They are to be encountered particularly frequently close to windows or on lighting fixtures, depending on the time of day.

12) In addition to the active ingredient, yeast and sugar, the trap can also contain other attractant substances, for example pheromones or other fragrances and attractants.

13) In a preferred embodiment, the trap comprises a two-chamber system, i.e. the lower part of the trap is formed into a second chamber which is separated from the upper part by a constriction or by a type of sluice. The constriction can be designed, for example, such that the wall material on the inside of the trap thickens, so that the upper and lower part of

the trap are separated from one another by only a narrow slit which is just wide enough to allow the absorbent matrix through. The absorbent matrix then forms the connection between the two chambers. In this embodiment, the lower chamber - which serves to accommodate the active ingredient and the other additives - comprises an absorbent, porous material, for example a sponge, water-absorbent fabric (for example cotton-wool), shredded paper, kieselguhr or the like, which is present in an amount such that the water needed to operate the trap is absorbed completely by this material. In the simplest case, the material is a sponge soaked with water. This material, for example the sponge, is in direct contact with the absorbent matrix, which has dimensions such that it represents a connection between the upper and lower chamber through the constriction. In this way, the entire liquid is distributed over the absorbent material of the lower chamber and over the absorbent matrix such that it is no longer possible to spill insecticide solution through the entry openings or the topping-up opening. This ensures even safer handling of the trap. It is clear that the topping-up opening, through which the water is added, is advantageously in the lower chamber. This can of course be designed such that it is closable. The absorbent material in the lower chamber or the absorbent matrix can be baited with all or some of the additives.

It goes without saying that the insecticide, the attractant, for example sugar, and the yeast can be spatially separated from one another, side by side or together before the use according to the invention - i.e. as long as they are still in a dry state. For example, the insecticide, sugar and yeast can form three water-soluble tablets. It is of course also possible for two components to be accommodated in one and the third component in another tablet. It is also possible for all three components to be in a single dissolvable form. It is also irrelevant to the present invention whether the said components are already in the trap before it is used or whether they are only added immediately before use. Before the components are used according to the invention, it is important for them to be in a storage-stable form which can be converted into a solution, emulsion or dispersion of the active ingredient in a simple manner.

A ready-to-use insect trap according to the invention comprises an amount of active substance which guarantees an overdose in respect of an individual insect so that it is ensured that no resistance development can take place. Adequate amounts of active substance are in general 0.2 to 4 g of active substance per trap. The amount of sugar is 0.1 to 2.0 g; the amount of yeast is 0.1 to 1.0 g. The volume of liquid after addition of water is 10 to 50 ml.

In the present invention, the combination of certain features is decisive for the surprising efficiency of the insect trap. Rapid and complete destruction of the target insects and easy handling of the improved insect trap is guaranteed only by the above combination of the features according to the invention.

If the insect trap according to the invention is used as a trap for flying insects, such as flies, the front and rear side are formed by the large surfaces and the entry openings are on the front side. If the trap is used against crawling insects, such as cockroaches or ants, the trap preferably lies on one of the large surfaces, while the other parallel large surface forms the top closure. The trap for crawling insects can also have the entry openings on the narrow sides. The colour and transparency of the container material does not play a decisive role in this trap. However, it has proved particularly advantageous if the cockroach trap becomes lower towards the back, since cockroaches of different stages of development also have different body sizes. Cockroaches search for hiding places which fit their body size. A cockroach trap which becomes lower towards the back offers a hideout for all development stages, as experiments show, and is also visited equally by all development stages.

Embodiment Example:

The container is made of a plastic about 0.8 to about 2 mm thick which is inert to the contents, the front and rear side of which are of equal size and have a rectangular shape. In (a) and (c), 15 black silhouettes of flies are printed on:

	a)	b)	c)
Material:	Polyethylene	Polystyrene	Polypropylene
Colour:	transparent yellow	transparent colourless	transparent orange
Height [cm]	31	10	15
Width [cm]	21	10	10
Depth [cm]	1	0.7	1
Thickness[mm]	1.2	0.8	1

While the rear side has only one circular hole of 0.8 cm cross-section for fixing in front of a light source, the front side has entry openings for the flying insects:

	a)	b)	c)
Number:	10 slits	6 slits	7 X 7 = 49 cir-
[cm]	0.8 x 15	0.7 x 8	cular holes of
	arranged	arranged	1 cm cross-
	vertically	vertically	section
	at intervals	at intervals	positioned in
	of 0.7 cm	of 0.8 cm	a square

Inside is an absorbent matrix of customary absorbent paper having the following external dimensions and form:

	a)	b)	c)
Height [cm]:	30.5	9.5	14.5
Width [cm]:	20.5	9.5	24
Shape:	flat sheet	flat sheet	zig-zag folding
			individual fold
			0.8 x 14.5

In all three cases (a), (b) and (c) the insecticide is a dry powder comprising a mixture of azamethiphos, sugar and yeast; the mixture is on the base of the container:

	a)	b)	c)
Amount of active substance [g]	2.5	1	3
Yeast [g]	1 baking yeast	0.8 brewer's yeast	0.5 wine yeast
Suger [g]	2.0	1.5	1.0

Tap water is added through the container which is open at the top:

	a)	b)	c)
Water [ml]	25	15	13

The ready-to-use container is fixed on the inside of a window pane with a suction pad of flexible plastic by means of the opening on its rear side, so that natural daylight can pass through.

Biological experiment:

The insect trap according to the invention is tested against commercially available insect traps under identical conditions. The housefly is chosen as the target insect and the efficiency of the traps is determined. The houseflies used are in each case 20 representatives of a fly strain from the breeding laboratories of CIBA-GEIGY. It is a strain which is sensitive to organophosphorous insecticides. After certain intervals of time, the dead flies are counted. All the traps are placed at 0830 hours in identical, previously well-aerated rooms (3 x 3 x 5 metres) with a window (3 x 2.5 metres) on the west side in accordance with their use instructions, i.e. either horizontally on the window sill or floor or vertically on the window pane. Only one trap is placed in each room. The rooms are empty apart from a hand washbasin filled with water. No fly food is laid out. The room temperature over the daily average is about 30°C. Cloudless sunny midsummer weather prevails during the experiment. One room remains completely untreated (contains no trap); 20 flies which serve as a control group are released in this. The fly traps according to the invention which are used in this experiment are traps according to formulation example a. One is fixed horizontally to the window pane, and another is laid flat, i.e. vertically, on the window sill. In one room, a fly trap according to the invention is placed on the floor in front of the window, but instead of water, this contains the same amount of beer (Brauerei Kronenberg Strasbourg).

The trap commercially available under the name 'SNIP®' is used as the comparison trap of the prior art. SNIP® is an azamethiphos/sugar-based trap having an active ingredient concentration of 1%. The SNIP® fly trap is used for comparison because it coincides with the trap according to the invention in respect of the active ingredient and sugar and therefore is the most comparable to the trap according to the invention.

Results:

Duration of experiment	Dead flies 0 hour	0.5 hour	3 hours	8 hours
Control group untreated flies	20	20	0	3
Trap according to the invention				
Trap on pane (with water)	20	14	16	20
Trap on window sill (with water)	20	3	15	18
Trap on floor (with beer)	20	11	11	17
SNIP comparison trap				
4 x SNIP dry on floor	20	1	1	7
8 x SNIP dry on floor	20	0	3	14

The comparison experiment shows not only the unexpected superiority of the fly trap according to the invention over the commercially available SNIP® trap, but also that the trap attached to the pane is more attractive to flies than that lying on the window sill. It also shows that the efficiency of the trap can be increased by adding beer.

WHAT IS CLAIMED IS:

1. An insect trap comprising a container, provided with a fixing device, for accommodating an absorbent matrix and the insecticide formulation as well as the attractant, which has the features that

a) the trap comprises a flat, essentially two-dimensional container having one or more entry openings for the insects;

b) the container is made of a material which is inert toward moisture, the insecticide formulation and environmental influences and is transparent to light;

c) the material is colourless or has a colouration which is attractive to flying insects;

d) the container is considerably higher and wider than it is deep;

e) the container has a topping-up opening for liquids;

f) a water-soluble, -emulsifiable or -dispersible insecticide formulation is present and

g) the insecticide formulation additionally comprises an insect attractant.

2. An insect trap according to claim 1, on the front side of which flies are silhouetted as true to nature as possible.

3. An insect trap according to either of claims 1 or 2, which has a mark up to which it is to be filled with water before use.

4. An insect trap according to any one of claims 1 to 3, which is 10 to 50 cm high, 6 to 50 cm wide and 1 mm to 5 cm deep, is made of transparent plastic, comprises slit-shaped entry openings for the target insects on the front side, which are positioned such that the liquid insecticide formulation cannot run out, and comprises, in addition to the insecticide formulation, fermentable constituents.

5. An insect trap according to any one of claims 1 to 4, wherein the inside of the tank forms a two-chamber system, the lower and the upper chamber being connected to one

another by a narrow opening of dimensions such that the absorbent matrix just fills it.

6. An insect trap according to claim 5, wherein the lower chamber comprises the filling opening for the water, and this lower chamber contains, in addition to the insecticide formulation and the attractant, absorbent porous material in an amount such that it is capable of absorbing the entire amount of water.

7. An insect trap according to any one of claims 1 to 6, which comprises sugar in combination with yeast as the attractant.

8. An insect trap according to any one of claims 1 to 7, which comprises, as the insecticide, at least one active ingredient chosen from the group comprising:

dichlorvos [= 2,2-dichlorovinyl dimethyl phosphate];
dimethoate [= O,O-dimethyl S-methylcarbamoylmethyl phosphorodithioate];
trichlorfon [= 2,2,2-trichloro-1-hydroxyethyl phosphonate];
dicrotophos [= (E)-2-dimethylcarbamoyl-1-methylvinyl dimethyl phosphate];
iodofenphos [= O-2,5-dichloro-4-iodophenyl O,O-dimethyl phosphorothioate];
ethion [= O,O,O',O'-tetraethyl S',S'-methylene bis(phosphorodithioate)];
azamethiphos [= S-6-chloro-2,3-dihydro-2-oxo-1,3-oxazolo-[4,5b]pyrid-3-ylmethyl-O,O-dimethyl phosphorothioate];
chlorfenvinphos [= 2-chloro-1-(2,4-dichlorophenyl)vinyl diethyl phosphate];
coumaphos [= O-3-chloro-4-methyl-2-oxo-2H-chromen-7-yl O,O-diethyl phosphorothioate];
fenchlorphos [= O,O-dimethyl O-2,4,5-trichlorophenyl phosphorothioate];
malathion [= O,O-diethyl O-4-notrophenyl phosphorothioate];
naled [= 1,2-dibromo-2,2-dichloroethyl dimethyl phosphate];
propetamfos [=3-[ethylamino(methoxy)phosphinothioyloxy]isocrotonate];
dioxathion [= S,S'-(1,4-dioxane-2,3-diyl) O,O,O',O'-tetraethyl bis(phosphorodithioate)];
phosmet [= O,O-dimethyl S-phthalimidomethyl phosphorodithioate];
propoxur [= 2-isopropoxyphenyl methylcarbamate];
bendiocarbe [= 2,2-dimethyl-1,3-benzodioxol-4-yl methylcarbamate (I)];
methomyl [= S-methyl N-(methylcarbamoyloxy)thioacetimidate];
dimetilan [= 1-dimethylcarbamoly-5-methylpyrazol-3-yl dimethylcarbamate];
bromophos [= O-4-bromo-2,5-dichlorophenyl O,O-dimethyl phosphorothioate];
chlorpyrifos [= O,O-diethyl O-3,5,6-trichloro-2-pyridyl phosphorothioate]

diazinon [= O,O-diethyl O-2-isopropyl-6-methylpyrimidin-4-yl phosphorothioate];
permethrin [= 3-phenoxybenzyl (1RS,3RS;1RS,3RS)-
3-(2,2-dichlorovinyl)-2,2-dimethylcycloprop anecarboxylate];
cypermethrin [= (R,S)-α-cyano-3-phenoxybenzyl
(1RS,3RS;1RS,3RS)-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate];
cyhalothrin [= (RS)-α-cyano-3-phenoxybenzyl (Z)-(1RS,3RS)-(2-chloro-3,3,3-trifluoro-
phenyl)-2,2-dimethylcyclopropanecarboxylate];
bioallethrin [= (S)-3-allyl-2-methyl-4-oxycyclopent-2-enyl
(1R,3R)-2,2-dimethyl-3-2-methylprop-1-enyl)cyclopropanecarboxylate];
bioresmethrin [= 5-benzyl-3-furylmethyl (1R,3R)-(2,2-dimethyl-3-(2-methylprop-1-enyl)-
cyclo-propanecarboxylate];
deltamethrin [= (S)-α-cyano-3-phenoxybenzyl-(1R,3R)-(2,2-dibromovinyl)-
2,2-dimethylcyclopropane-car boxylate]; and
pyrethrin [= (Z)-(S)-2-methyl-4-oxo-3-(penta-2,4-dienyl)-cyclopent-2-enyl(1R,3R)-
2,2-dimethyl-(2-methylprop-1-enyl)cyclopropanecarboxylate].

9. An insect trap according to any one of claims 1 to 8, which comprises, as the attractant, at least one substance from the following group: beer, malt, orange peel essence, honey, sugar, dried fruits, vanillin, cereal flours, milk powder, egg powder, meat flour, fish meal, bone meal, yeast powder, natural or artificial fruit, meat or cheese aromas, amino acids, pollen extracts, thymol, skatole, indole, eugenol, terpineol, farnesol, geraniol, phenylethyl alcohol, paraformaldehyde, hexamethylenetetramine, ammonium carbonate, aliphatic amines, combinations of tertiary amines with carboxylic acids, papain, pancreatin, aliphatic lactones, chlorinated alkenes, higher straight-chain or branched alkenes having about 19 to about 24 carbon atoms, the ethylene bond of which lies between C-7 and C-11, preferably 9-methyl-octadec-9-ene, nonadec-9-ene, 2-methyl-nonadec-9-ene, eicos-9-ene, 2-methyl-eicos-8-ene, 8-methyl-eicos-8-ene, 10-methyl-eicos-8-ene, 2-methyl-eicos-9-ene, 10-methyl-eicos-9-ene, 19-methyl-eicos-9-ene, heneicos-9-ene, 2-methyl-heneicos-8-ene, 8-methyl-heneicos-8-ene, 2-methyl-heneicos-9-ene, 10-methyl-heneicos-9-ene, 19-methyl-heneicos-9-ene, 20-methyl-heneicos-9-ene, 19-ethyl-heneicos-9-ene, docos-8-ene, docos-9-ene, 2-methyl-docos-8-ene, 8-methyl-docos-8-ene, 10-methyl-docos-8-ene, 2-methyl-docos-9-ene, 10-methyl-docos-9-ene, 19-methyl-docos-9-ene, 20-methyl-docos-9-ene, 21-methyl-docos-9-ene, 19-ethyl-docos-9-ene, 20-ethyl-docos-9-ene, tricos-7-ene, tricos-8-ene, tricos-9-ene, tricos-10-ene, tricos-11-ene, 2-methyl-tricos-8-ene, 2-methyl-tricos-9-ene, 9-methyl-tricos-9-ene, 10-methyl-tricos-9-ene,

19-methyl-tricos-9-ene, 20-methyl-tricos-9-ene, 22-methyl-tricos-9-ene, tetracos-9-ene and tetracos-10-ene), acuba fruit extract or an aliphatic polyol monoester.

10. An insect trap according to any one of claims 1 to 9, wherein the target insects are flies or cockroaches.

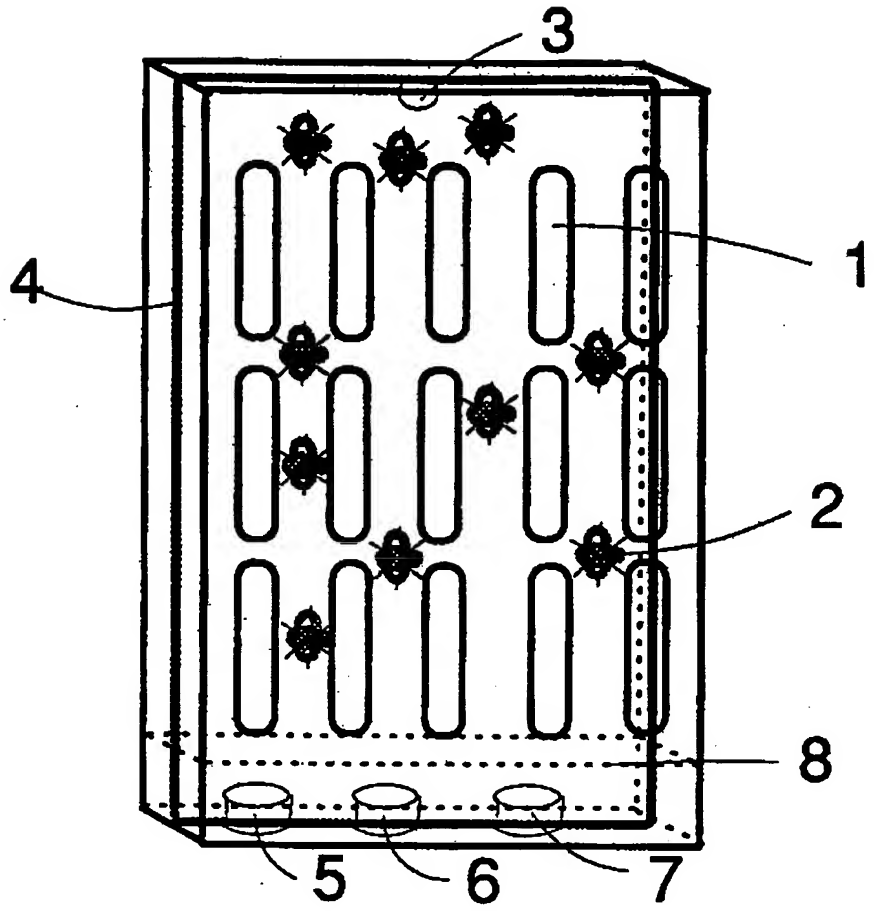

Fig. 1

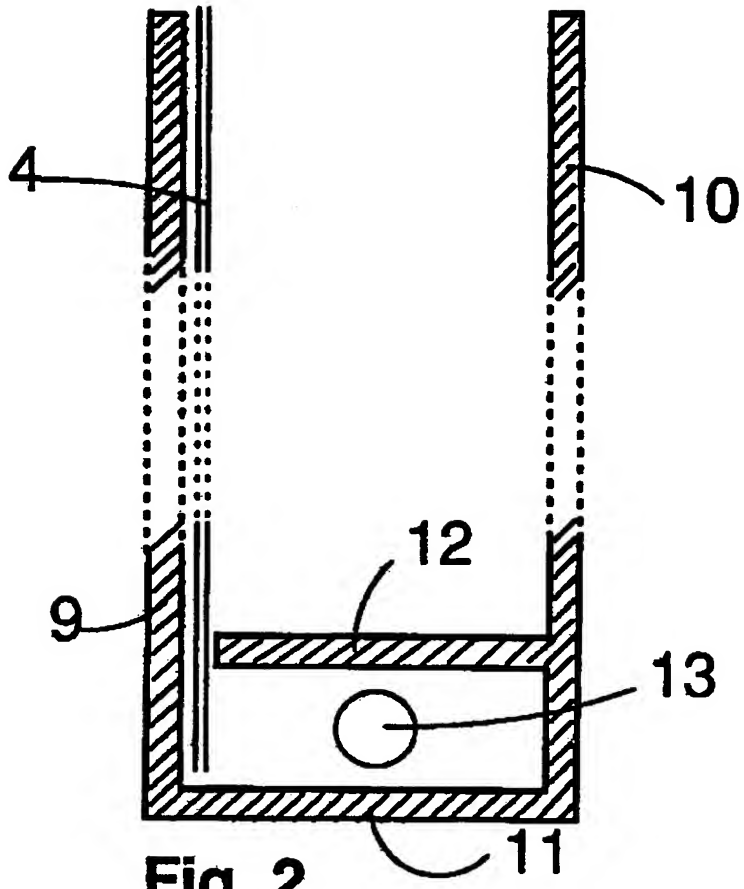

Fig. 2

INTERNATIONAL SEARCH REPORT

International Application No PCT/EP 93/01098

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 A01M1/02; A01M1/20

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	A01M

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category[9]	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
Y	FR,A,2 143 723 (CIBA-GEIGY AG) 9 February 1973 see claims 1,2,5,13,16; figures	1,4,5, 8-10
Y	EP,A,0 100 730 (L'OREAL SOCIETE ANONYME) 15 February 1984 see page 6, line 1 - page 8, line 16; figures	1,4,5, 8-10
A	DE,A,3 511 215 (IGU AG) 2 October 1986 see page 14, line 22 - line 26; figure 8	2
A	US,A,4 899 485 (R.G. SCHNEIDMILLER) 13 February 1990 see column 6, line 50 - line 55; figures	3,6,7
A	US,A,4 986 024 (T.W. PEEK ET AL.) 22 January 1991	

-/--

[9] Special categories of cited documents :[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
02 AUGUST 1993	12.08.93
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	MARANGONI G.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	DE,A,3 303 889 (DER NIEDERSÄCHSISCHE MINISTER FÜR ERNÄHRUNG) 23 February 1984	

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

EP 9301098
SA 73431

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 02/08/93

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DE-A-3511215	02-10-86	None		
US-A-4899485	13-02-90	None		
US-A-4986024	22-01-91	None		
DE-A-3303889	23-02-84	AT-B-	386320	10-08-88
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